

REMARKS

Attached hereto is a marked-up version of the changes made to the application by this Amendment. Reconsideration and allowance of the subject application are respectfully requested.

Upon entry of this Amendment, claims 1-30 will be pending in the present application. Claims 1, 22 and 30 are independent claims. Claims 13, 15, 17, 18, 19, 20 and 30 have been amended by this Reply. Claim 30 is a new claim.

REJECTIONS BASED ON 35 U.S.C. § 112, SECOND PARAGRAPH

The Examiner rejected Claim 15 under 35 U.S.C. §112, second paragraph as failing to set forth the subject matter which Applicant regards as his invention. The Examiner asserts that a plasma, by definition, is either physically or chemically reactive. This rejection is respectfully traversed

It is well understood in U.S. patent law that an inventor may be his or her own lexicographer as long as the meanings are not antagonistic to commonly understood usage. *Autogiro Co. of Am. v. U.S.*, 384 F.2d 391, 397 (C.C.P.A. 1967). It is also well understood that once a meaning is established, it will carry its denotations and connotations, unless specifically disclaimed in the specification.

In this case, the Applicant has provided the intended meaning for the term “non-reactive” in the specification, and is consistent in the application of that meaning to claim 15. Particularly, page 6, line 21 through page 7, line 2 of Applicant’s Specification defines the use of the term non-reactive as follows:

When using the non-reactive gas, such as the Ar or N₂ plasma gas, the binding force of the surface of the metal layer 44 becomes depressed physically. In particular, Ar or N₂ ions physically strike the surface of the metal layer 44, thereby breaking chemical bonds and lowering the overall binding force of the metal layer.

Applicant’s Specification at Page 6, line 21

The Examiner also admits that gases such as Ar may lower the binding force in a metal layer. Therefore Claim 15 does not fail to set forth the subject matter which applicant regards as his invention. Nevertheless, claim 15 is amended such that it does not recite a non-reactive gas as a plasma gas. Withdrawal of the Examiner’s rejection under 35 U.S.C. §112, second paragraph is respectfully requested.

REJECTION OF CLAIMS UNDER 35 U.S.C. § 103

Hirano in View of Chen

Claims 1, 2, 5-9, 11-13, 15, 16, 20-22, 24, 28 and 29 stand rejected under 35 U.S.C. §103(a) over U.S. Patent No. 5,771,110 to Hirano et. al. (Hirano) in view of U.S. Patent No. 6,133,145 to Chen, for the reasons set forth in paragraph 4 of the Office Action. This rejection is respectfully traversed.

Hirano teaches forming a resist pattern on an indium tin oxide film (ITO film), and then etching the film by RIE initially employing hydrogen bromide gas (HBr). The HBr gas is used to etch down to the silicon dioxide film. Once exposure of the silicon oxide film is started with HBr gas, a switch to chlorine gas (Cl₂) is made in order to complete the etching process initially begun with HBr. Therefore, Hirano, teaches using a first plasma to etch (not lower a binding force in) an ITO film. Hirano does not disclose or suggest treating the exposed portion of the metal layer with a first plasma, prior to etching, using the photoresist pattern as a mask, to lower a binding force in the exposed portion, as recited in independent claim 1, and similarly stated in claims 22 and 30.

Chen is directed to a plasma treatment, applied to a photoresist shape, prior to the metal etch cycle. The plasma treatment of the photoresist shape does not lower a binding force, but actually increases a binding force in the photoresist shape, while maintaining the same removal rate of the exposed metal (see Chen, Col. 1, lines 29-35).

Chen, teaches increasing a binding force in a photoresist (not a metal). Therefore, Chen does not disclose or suggest treating the exposed portion of the metal layer with a first plasma, prior to etching, using the photoresist pattern as a mask, to lower a binding force in the exposed portion, as recited in independent claim 1, and similarly stated in claims 22 and 30.

Claims 2, 5-9, 11, 13, 15, 16, 20, 21, 24, 28 and 29 depend on claims 1, 22, and 30. Since neither Hirano, nor Chen disclose or suggest the features of independent claims 1, 22 and 30 either singly or in combination, Hirano, in view of Chen cannot render claims 1, 2, 5-9, 11-13, 15, 16, 20-22, 24, 28 and 29 obvious to one of ordinary skill in the art. In view of the above remarks, reconsideration and withdrawal of the art grounds of rejection are respectfully requested.

Hirano and Chen in View of Ye

Claims 10, 17-19 and 25-27 stand rejected under 35 U.S.C. 103(a) over Hirano and Chen (as applied to claims 1, 7, 12 (now 30), and 22) in view of U.S. Patent No. 5,968,847 to Ye et al. (Ye). This rejection is respectfully traversed.

Ye teaches a copper etchback process that is based on physical bombardment combined with an etchant species which is chemically reactive with copper, preferably, a halogen-containing compound. The copper etchback process of Ye does not, however, disclose or suggest a step of treating as distinguished from a step of etching as claimed in independent claims 1, 22, and 30.

Therefore Ye, like Hirano and Chen (argued above) does not disclose or suggest treating the exposed portion of the metal layer with a first plasma, prior to etching, using the photoresist pattern as a mask, to lower a binding

force in the exposed portion as recited in independent claim 1, and similarly stated in claims 22 and 30.

Claims 10, 17-19, and 25-27, depend on claims 1, 22, and 30. Since neither Hirano and Chen, nor Ye discloses or suggests the features of independent claims 1, 22, and 30, Hirano and Chen in view of Ye cannot render claims 10, 17-19 and 25-27 obvious to one of ordinary skill in the art. Reconsideration and withdrawal of this art grounds of rejection is respectfully requested.

CONCLUSION

Applicant considers all of the Examiner's comments to have been addressed and all of the Examiner's rejections overcome, thereby placing all claims pending in the present Application in condition for allowance. Accordingly, a Notice of Allowability is solicited in earnest.

In the event that any outstanding matters remain in this application, Applicant requests that the Examiner contact the undersigned at (703) 205-8000 to discuss such matters.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.


Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In The Claims:

The claims have been amended as follows:

13. (Amended) The method of claim [12] 30, wherein the first plasma is a reactive gas.

15. (Amended) The method of claim 30 [12], wherein the first gas [plasma] is a non-reactive gas.

17. (Amended) The method of claim [12] 30, wherein the second plasma includes HBr plasma gas.

18. (Amended) The method of claim [12] 30, wherein the second plasma includes a composition of HBr plasma gas and Cl₂ plasma gas.

19. (Amended) The method of claim [12] 30, wherein the second plasma includes a composition of HBr plasma gas and CH₄ plasma gas.

20. (Amended) The method of claim [12] 30, wherein the metal layer includes one of indium tin oxide (ITO) and indium zinc oxide (IZO).

21. (Amended) The method of claim [12] 30, further comprising:

removing the photoresist pattern from the pixel electrode.

New claim 30 has been added.